About Electricity...

What is Electricity?

Energy is around us in a variety of forms, which include, to name just a few, gasoline, running water, light and electricity. We often transfer energy from one form to another, for example, when an automobile uses the chemical energy in fuel to move. Some types of energy are easy to store (i.e. chemical) and others are easy to move from one place to another (i.e. electricity and light).

Electricity is one form of energy that we have harnessed in the past 100 years. By definition, electricity is the energy available from the movement of electrons within a conducting material. It is analogous to water flowing out of a hose; the electrons are like drops of water. Enough electrons with force behind them can perform useful work.

Amp hours and watt hours...

In power systems we describe the total amount of energy consumed over a certain period in either amp hours or watt hours. A one amp *current* draw for 4 hours has used a total of 4 *amp hours* (AHr). A 100 watt light bulb over 24 hours uses 2400 *watt hours* (WHr) or 2.4 *kilowatt hours* (kWHr) of energy. Note: a kilowatt equals 1000 watts, and a kilowatt hour equals 1000 watt hours. Your local hydro utility charges per kilowatt hour used.

The difference between volts, amps and watts

The common units that are used to represent the quantity of electricity are:

Volts: Electrical force or pressure behind the electrons in a circuit. Analogous to water pressure or PSI, it tells us the system voltage.

Ampere (Amps): The number of electrons flowing past a defined point in a second. Like gallons per second in a pipe, it defines the electrical current in a wire.

Watts: Total amount of electrical energy.
Watts = Volts x Amps

Q: How many amps does a 60 watt light bulb use?
A: This depends on the system voltage.

1. At 12 volts,
60 watts/12 volts = 5 amps.

60 watt
120 volt AC

2. At 120 volts,
60 watts/120 volts = 0.5 amps.

60 watt
12 volt DC

Amps = Watts / Volts

AC versus DC current...

Just to make things interesting, electrical energy is moved from place to place in two ways.
Alternating current (AC) is the most common form; utility power arrives to us as high voltage AC current. Alternating current is like water sloshing back and forth in a bath, the same electrons doing the work in one spot. Solar panels and batteries produce direct current (DC), which is easier to store. DC current is usually used at lower voltages, i.e. 12 or 24 VDC.

Inverters convert DC to AC power…

You may choose to install an inverter to complete your power system. An inverter converts battery energy, which is DC power, to AC power, so that regular 120 volt appliances will operate. An inverter allows you to you use microwaves, toasters and TVs without a generator.

The Inverter section of this catalogue lists many models that are suitable for installation in homes, cottages, RVs and at industrial sites.

Advantages of higher voltages...

In all power systems we have to move the electricity from one place to another. The transfer is not 100% efficient, and we must take care to minimize the power losses en route. In wire, the loss of electrical power is a factor of the resistance of the wire, and the amount of current going through it. In general, for a given wire size, the lower the current and in turn, the lower the power loss.

*Appliance Power Ratings**

Appliance	Watts	Appliance	Watts	Appliance	Watts
Ceiling Fan (DC)	25	Laser Printer	400-600	Stereo (AC)	10-30
Cell Phone Charger	20	Lights - Incandescent	15-100	Television (20”)	75
Coffee Maker	600	Lights - Fluorescent	7-80	Television (30”)	125
Computer	100-300	Microwave	800	Toaster	1000
Drill	300	Radio (DC)	5	VCR	20
Freezer (10 cu. ft.)	300	Refrigerator	250-500	Water Pump (DC)	120
Furnace Fan	500-600	Skill Saw	1000	Well Pump (AC)	1400
Hair Dryer	1500				

*The above table shows the approximate draw of common household appliance in watts.